CLAIMS

1. A thermal interface comprising:

a thermally conductive fluid; and

a flexible enclosure for confining the thermally conductive fluid.

2. The thermal interface of claim 1, further comprising:

a flexible liner lining an interior surface of the enclosure.

3. The thermal interface of claim 2, wherein the liner is formed from a chemically inert metal.

4. The thermal interface of claim 1, further comprising:

at least one containment pad surrounding a perimeter edge of the enclosure.

5. The thermal interface of claim 4, wherein the at least one containment pad comprises:

an indentation sized and positioned to receive the perimeter edge of the enclosure, for sealing the thermal interface against an outside environment.

6. The thermal interface of claim 1, wherein the thermally conductive fluid is a liquid metal.

7. The thermal interface of claim 6, wherein the liquid metal is selected from a group consisting of gallium, mercury, gallium-indium and mercury-gold.

8. The thermal interface of claim 1, wherein the enclosure comprises:

at least one flexible metal foil.

9. The thermal interface of claim 8, wherein the at least one flexible metal foil is selected from a group consisting of copper, aluminum, stainless steel, nickel and silicon.

10. The thermal interface of claim 8, wherein the enclosure comprises:

two flexible foils sealed together around a perimeter edge to form a cavity therebetween.

11. The thermal interface of claim 8, wherein the enclosure comprises:

a single flexible foil folded over and sealed around a perimeter edge to create a pocket.

12. An integrated circuit device comprising:

at least one heat source;

at least one heat sink positioned in proximity to the at least one heat source; and

at least one thermal interface positioned between the at least one heat source and the at least one heat sink, the thermal interface comprising:

a thermally conductive fluid; and

an enclosure for confining the thermally conductive fluid, wherein at least one surface of the enclosure is flexible and the enclosure is in thermal contact with both the at least one heat source and the at least one heat sink.

13. The integrated circuit device of claim 12, wherein the at least one thermal interface further comprises:

a flexible liner lining an interior surface of the enclosure.

14. The integrated circuit device of claim 13, wherein the liner is formed from a chemically inert metal.

15. The integrated circuit device of claim 12, further comprising:

at least one optimization layer disposed between the at least one thermal interface and the at least one heat source, between the at least one thermal interface and the at least one heat sink, or both, the optimization layer comprising a material selected from the group consisting of water, epoxy, oil, paste, solder, organic fluid and liquid metal.

16. The integrated circuit device of claim 12, wherein the thermally conductive fluid is a liquid metal.

17. The integrated circuit device of claim 12, wherein the enclosure comprises:

at least one flexible metal foil.

18. The integrated circuit device of claim 17, wherein the enclosure comprises:

two flexible foils sealed together around a perimeter edge to form a cavity therebetween.

19. The integrated circuit device of claim 17, wherein the enclosure comprises:

a single flexible foil folded over and sealed around a perimeter edge to create a pocket.

20. The integrated circuit device of claim 17, wherein the enclosure comprises a single metal foil sealed around its perimeter edge to a surface of the at least one heat sink.

21. The integrated circuit device of claim 12, wherein the enclosure comprises:

at least one flexible gasket sealing a perimeter around the at least one heat source and the at least one heat sink.

22. The integrated circuit device of claim 12, wherein the at least one thermal interface further comprises:

at least one containment pad surrounding a perimeter edge of the enclosure.

23. The integrated circuit device of claim 22, wherein the at least one containment pad comprises:

an indentation sized and positioned to receive the perimeter edge of the enclosure, for sealing the at least one thermal interface against an outside environment.

24. The integrated circuit device of claim 12, wherein the at least one thermal interface comprises a plurality of thermal interfaces arranged in the form of an interposer.

25. An integrated circuit device comprising:

at least one heat source;

at least one heat sink positioned in proximity to the at least one heat source; and

at least one thermal interface positioned between the at least one heat source and the at least one heat sink, the thermal interface comprising:

a thermally conductive fluid retained between the at least one heat source and the at least one heat sink; and

at least one flexible gasket sealing a perimeter around the at least one heat source and the at least one heat sink, for retaining the fluid therebetween.

26. Method for facilitating heat transfer from a heat source to a heat sink, the method comprising the steps of:

providing a thermally conductive fluid between the heat source and the heat sink, said thermally conductive fluid being in thermal contact with both the heat source and the heat sink; and

enclosing the thermally conductive fluid in a thermally conductive enclosure, wherein at least a portion of the enclosure is flexible.

27. The method of claim 26, wherein the step of enclosing the thermally conductive fluid comprises enclosing the fluid in a cavity formed between two flexible foils.

28. The method of claim 26, wherein the step of enclosing the thermally conductive fluid comprises enclosing the fluid in a cavity formed between a flexible foil and the heat sink, the flexible foil being sealed to the heat sink around a perimeter edge.

29. The method of claim 26, wherein the step of enclosing the thermally conductive fluid comprises enclosing the fluid in a cavity formed between the heat source and the heat sink, the cavity being sealed around a perimeter by a flexible gasket.

30. Method for assembling a multi-chip integrated circuit device comprising the steps of:

assembling two or more integrated circuit chips on a substrate;

placing a thermal interface in contact with each of the two or more integrated circuit chips, the thermal interface comprising:

a thermally conductive fluid; and

a flexible enclosure for confining the thermally conductive fluid; and

placing a heat sink in thermal contact each of the two or more integrated circuit chips.